

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (new) An oxynitride phosphor consisting of a crystal containing at least one or more of Group II elements selected from the group consisting of Be, Mg, Ca, Sr, Ba and Zn, at least one or more of Group IV elements selected from the group consisting of C, Si, Ge, Sn, Ti, Zr and Hf, and a rare earth element being an activator: R, said crystal having a unit lattice of the orthorhombic system.

2. (new) The oxynitride phosphor according to claim 1;
wherein said crystal is substantially Al-free crystal.

3. (new) The oxynitride phosphor according to claim 1;
wherein said Group II elements in which Ba is essential are one or more selected from the group consisting of Ca, Sr, Ba and Zn and said Group IV elements in which Si is essential are one or more selected from the group consisting of C, Si, Ge, Sn, Ti, Zr and Hf,
wherein said activator R contains Eu.

4. (new) The oxynitride phosphor according to claim 1;
wherein said Group II element and said activator R are in a molar ratio of 1 : 0.005 to 1 : 0.15.

5. (new) The oxynitride phosphor according to claim 1;
containing O and N of which weight ratio is set so that N is within a range of 0.2
to 2.1 per 1 of O.

6. (new) The oxynitride phosphor according to claim 1; which is represented
by a general formula of $L_xM_yO_zN_{((2/3)X+(4/3)Y-(2/3)Z)}:R$ (L is at least one or more of Group II
elements selected from the group consisting of Be, Mg, Ca, Sr, Ba and Zn. M is at least
one or more of Group IV elements selected from the group consisting of C, Si, Ge, Sn,
Ti, Zr and Hf. O is an oxygen element. N is a nitrogen element. R is a rare earth
element. $0.5 < X < 1.5$, $1.5 < Y < 2.5$, and $1.5 < Z < 2.5$).

7. (new) The oxynitride phosphor according to claim 6;
wherein said L in which Ba is essential are one or more selected from the group
consisting of Ca, Sr, Ba and Zn and said M in which Si is essential are one or more
selected from the group consisting of C, Si, Ge, Sn, Ti, Zr and Hf,
wherein said activator R contains Eu.

8. (new) The oxynitride phosphor according to claim 6;
wherein said X, said Y and said Z are $X = 1$, $Y = 2$, and $Z = 2$.

9. (new) The oxynitride phosphor according to claim 6;
wherein 50 weight % or more of said R is Eu.

10. (new) The oxynitride phosphor according to claim 1; which is represented by a general formula of $L_xM_yQ_TO_ZN_{((2/3)X+(4/3)Y+T-(2/3)Z)}:R$ (L is at least one or more of Group II elements selected from the group consisting of Be, Mg, Ca, Sr, Ba and Zn. M is at least one or more of Group IV elements selected from the group consisting of C, Si, Ge, Sn, Ti, Zr and Hf. Q is at least one or more of Group III elements selected from the group consisting of B, Al, Ga and In. O is an oxygen element. N is a nitrogen element. R is a rare earth element. $0.5 < X < 1.5$, $1.5 < Y < 2.5$, $0 < T < 0.5$, and $1.5 < Z < 2.5$).

11. (new) The oxynitride phosphor according to claim 10;
wherein said L in which Ba is essential are one or more selected from the group consisting of Ca, Sr, Ba and Zn and said M in which Si is essential are one or more selected from the group consisting of C, Si, Ge, Sn, Ti, Zr and Hf,
wherein said activator R contains Eu.

12. (new) The oxynitride phosphor according to claim 10;
wherein said X, said Y and said Z are $X = 1$, $Y = 2$, and $Z = 2$.

13. (new) The oxynitride phosphor according to claim 10;
wherein 50 weight % or more of said R is Eu.

14. (new) The oxynitride phosphor according to claim 1;
which is excited by light from an excitation light source having a luminescence peak wavelength at 490nm or less, and have luminescence spectra having

luminescence peak wavelengths at a longer wavelength side than said luminescence peak wavelength.

15. (new) The oxynitride phosphor according to claim 1; which comprises Ba, Si and Eu and which is excited by light from the excitation light source having a luminescence peak wavelength at 360nm to 480nm, and emits light having luminescence spectra having luminescence peak wavelengths at a longer wavelength side than said luminescence peak wavelength.

16. (new) The oxynitride phosphor according to claim 1; which has a luminescence spectra having a peak wavelength in a range of from blue green to yellow red region.

17. (new) The oxynitride phosphor according to claim 1; which comprises Ba, Si and Eu and has a luminescence spectra having a peak wavelength in a range of from blue green to green region.

18. (new) The oxynitride phosphor according to claim 1;
wherein luminescence intensity excited by light of 370nm is higher than luminescence intensity excited by light of 500nm.

19. (new) The oxynitride phosphor according to claim 1;
which comprises Ba, Si and Eu,
wherein the luminescence intensity excited by light of about 460nm is higher than
luminescence intensity excited by light of about 350nm.
20. (new) The oxynitride phosphor according to claim 1; which has 2 or more
of Group II elements selected from the group consisting of Be, Mg, Ca, Sr, Ba and Zn.
21. (new) The oxynitride phosphor according to claim 1; which contains Sr
and Ca in a molar ratio of Sr : Ca = x:y($0 < x < 10$, $0 < y < 10$).
22. (new) The oxynitride phosphor according to claim 1; which contains Sr
and Ba in a molar ratio of Sr : Ba = x:y($5 \leq x < 10$, $0 < y \leq 5$).
23. (new) The oxynitride phosphor according to claim 1; which contains Ca
and Ba in a molar ratio of Ca : Ba = x:y($0 < x < 10$, $0 < y < 10$).
24. (new) The oxynitride phosphor according to claim 1; of which
luminescence peak wavelength and color tone are set by an addition amount of said
activator R.

25. (new) The oxynitride phosphor according to claim 1;

Wherein a portion of Group II element is substituted with said activator R in a molar ratio of (a mix amount of said Group II elements and said activator R) : (the amount of said activator R) = 1 : 0.001 to 1 : 0.8.

26. (new) A process for production of an oxynitride phosphor comprising;

a first step of mixing raw materials containing the nitride of L (L is at least one or more of Group II elements selected from the group consisting of Be, Mg, Ca, Sr, Ba and Zn, the nitride of M (M is at least one or more of Group IV elements selected from the group consisting of C, Si, Ge, Sn, Ti, Zr and Hf), the oxide of M, and the oxide of R (R are one or more rare earth elements), and

a second step of firing the mixture obtained in said first step.

27. (new) The process for production of an oxynitride phosphor according to claim 26;

wherein said Group II elements in which Ba is essential are one or more selected from the group consisting of Ca, Sr, Ba and Zn,

wherein said Group IV elements in which Si is essential are one or more selected from the group consisting of C, Si, Ge, Sn, Ti, Zr and Hf,

wherein said rare earth elements contain Eu.

wherein said oxide of R and said nitride of L are in a molar ratio within a range of said nitride of L : said oxide of R = 1 : 0.005 to 1 : 0.15.

28. (new) The process for production of an oxynitride phosphor according to claim 26;

wherein a nitride of R is used in place of said oxide of R, or together with said oxide of R.

29. (new) The process for production of an oxynitride phosphor according to claim 26;

wherein a compound of Q (Q is at least one or more of Group III elements selected from the group consisting of B, Al, Ga and In) is further mixed in said first step.

30. (new) The process for production of an oxynitride phosphor according to claim 26;

wherein said nitride of L, said nitride of M and said oxide of M are adjusted in molar ratios of $0.5 < \text{the nitride of L} < 1.5$, $0.25 < \text{the nitride of M} < 1.75$ and $2.25 < \text{the oxide of M} < 3.75$ in said first step.

31. (new) The process for production of an oxynitride phosphor according to claim 26;

wherein at least a portion of the raw material of said nitride of L is substituted with at least either of the oxide of R and a nitride of R.

32. (new) The oxynitride phosphor produced by the process according to claim 26.

33. (new) A light-emitting device comprising;
an excitation light source and a phosphor converting the wavelength of at least the portion of light from said excitation light source,
wherein an oxynitride phosphor having the luminescence peak wavelength at a blue green to yellow region is contained in said phosphor, said oxynitride phosphor having a crystal structure of the orthorhombic system.

34. (new) The light-emitting device according to claim 33;
Wherein said phosphor contains an oxynitride phosphor in which Ba is essential, said oxynitride phosphor having the luminescence peak wavelength at a blue green to green region.

35. (new) The light-emitting device according to claim 33;
wherein said oxynitride phosphor consist of a crystal containing at least one or more of Group II elements selected from the group consisting of Be, Mg, Ca, Sr, Ba and Zn, at least one or more of Group IV elements selected from the group consisting of C, Si, Ge, Sn, Ti, Zr and Hf, and a rare earth element being an activator: R, said crystal having a unit lattice of the orthorhombic system.

36. (new) The light-emitting device according to claim 33;
wherein said excitation light source has at least one or more of luminescence peak wavelengths in a range of a short wavelength side region of visible light to ultraviolet.

37. (new) The light-emitting device according to claim 33;
wherein said excitation light source is a light-emitting element.

38. (new) The light-emitting device according to claim 33;
wherein said light-emitting element has a nitride semiconductor containing In.

39. (new) The light-emitting device according to claim 33;
wherein said phosphor includes a second phosphor together with said oxynitride phosphor, said second phosphor carrying out the wavelength conversion of at least a portion of light from said excitation light source and having a luminescence spectrum including one or more peak wavelengths in visible region.

40. (new) The light-emitting device according to claim 33;
wherein said second phosphor has a luminance spectrum including at least one or more luminescence peak wavelengths from a blue region to red region.

41. (new) The light-emitting device according to claim 33;
wherein a light selected from the group consisting of (1)a light mixed of a portion of the light from said excitation light source and the light from said oxynitride phosphor, (2)a light mixed of a portion of the light from said excitation light source and the light from said second phosphor, (3)a light mixed the light from said oxynitride phosphor and the light from said second phosphor, (4)a light mixed of a portion of the light from said excitation light source, the light from said oxynitride phosphor and the light from said second phosphor, is output.

42. (new) The light-emitting device according to claim 33;
which has a luminescence color being set at an intermediate luminescence color from the peak wavelength of said excitation light source to the peak wavelength of said oxynitride phosphor or the peak wavelength of said second phosphor.

43. (new) The light-emitting device according to claim 42;
wherein the luminescence color is white color.

44. (new) The light-emitting device according to claim 33;
wherein the luminescence spectrum has at least one or more of luminescence peak wavelengths in the ranges consisting of a range of 430 to 500nm and a range of 500 to 730nm.

45. (new) The light-emitting device according to claim 33;
wherein said oxynitride phosphor has Ba, Si and a rare earth element being an activator:R,
wherein the luminescence spectrum has at least one or more luminescence peak wavelengths in the ranges consisting of a range of 360 to 485nm, a range of 485 to 548nm and a range of 548 to 730nm.

46. (new) The light-emitting device according to claim 33;
wherein said oxynitride phosphor has Ba, Si and a rare earth element being an activator:R,

wherein the luminescence spectrum has at least one or more luminescence peak wavelengths in the ranges consisting of a range of 360 to 485nm and a range of 485 to 548nm.

47. (new) The light-emitting device according to claim 33;
wherein said oxynitride phosphor has Ba, Si and a rare earth element being an activator:R,
wherein the average rendering index (Ra) is 80 or more.